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**THE DETERMINANTS OF
HOST COUNTRY SPILLOVERS FROM
FOREIGN DIRECT INVESTMENT**

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ABSTRACT

The Determinants of Host Country Spillovers from Foreign Direct Investment*

This Paper reviews and synthesizes the available literature focusing on the determinants of efficiency spillovers from inward Foreign Direct Investment (FDI). In order to do so, we outline a theoretical framework for understanding the underlying 'supply' and 'demand' forces determining the scope and magnitude of FDI spillovers to host economies. The findings suggest that the competitiveness of host country markets and the technical capability of local firms are among the most important determinants of spillover benefits. Both of these characteristics can be influenced by host country policy.

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NON-TECHNICAL SUMMARY

The existence of spillover efficiency benefits to host country economies from inward Foreign Direct Investment (FDI) are well documented in the literature, particularly for economically developed host economies. The determinants of the size and scope of the spillover benefits have also been studied, but they are not as clearly and consistently documented as the existence and magnitude of the relevant externalities. Yet, a good understanding of the determinants of the nature and magnitude of FDI efficiency spillovers is of crucial importance to policy-makers.

The primary purpose of this Paper is to review and synthesize the available literature focusing on the determinants of efficiency spillovers from inward FDI. In order to do so, we also outline a theoretical framework for understanding the underlying 'supply' and 'demand' forces determining the scope and magnitude of FDI spillovers to host economies. The findings suggest that the competitiveness of host country markets, proxied e.g. by the openness to imports, and the technical capability of local firms are among the most important determinants of spillover benefits. Both of these characteristics can be influenced by host country policy. However, it is difficult to provide unequivocal policy advice on the basis of these findings, since some of the policies that maximize the potential spillovers from a given 'pool' of appropriable technology (such as technology transfer requirements or active competition policies) may actually reduce the attractiveness of the host country to some foreign investors.

THE DETERMINANTS OF HOST COUNTRY SPILLOVERS FROM FOREIGN DIRECT INVESTMENT

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1. Introduction*

The existence of spillover efficiency benefits to host country economies from inward foreign direct investment (FDI) are well documented in the literature, particularly for economically developed host economies.¹ The determinants of the size and scope of the spillover benefits have also been studied, but they are not as clearly and consistently documented as the existence and magnitude of the relevant externalities.

Various factors have been suggested to condition the size and nature of FDI productivity spillovers including such host country characteristics as industrial market structure, technological sophistication and overall economic size. Attributes of the nature of the inward FDI have also been considered, such as whether the dominant mode of international business is a wholly owned affiliate, a minority owned affiliate, or a strategic alliance. Some attention has also been paid to the motives and attributes of the foreign investor. Nevertheless, we would argue that theoretical consideration of the determinants of FDI spillovers has been relatively *ad hoc* and limited. Perhaps as a consequence, there is no well-established theoretical paradigm for the determinants of

* Blomström and Kokko gratefully acknowledge HSFER for financial support.

¹ For reviews of the relevant literature, see Blomström (1991) and Blomström and Kokko (1998).

spillover efficiency benefits to guide empirical research. Indeed, a casual reading of the relevant literature conveys a sense of conflicting or inconclusive theoretical, as well as empirical evidence.²

Clearly, a good understanding of the determinants of the nature and magnitude of FDI efficiency spillovers is of crucial importance to policymakers. Sectoral and related restrictions on inward FDI continue to keep capital markets segmented. The ability to leverage spillover efficiency benefits from inward FDI is an important stimulant to a host government's willingness to reduce or eliminate the relevant restrictions. Moreover, many government policies not directly related to FDI would be seen as even more (or less) in the public interest if they had substantive positive (or negative) impacts on the benefits that the economy derived from inward FDI.

The primary purpose of this paper is to review and synthesize the available literature focusing on the determinants of efficiency spillovers from inward FDI. In particular, we attempt to identify points of agreement and to reconcile, if possible, points of disagreement. We also identify issues that merit additional study for the potential light they might shed upon the FDI spillover process. In order to do so, we outline a theoretical framework for understanding the underlying "supply" and "demand" forces determining the scope and magnitude of FDI spillovers to host economies.

The paper proceeds as follows. In the next section, we present and discuss a theoretical framework for identifying determinants of FDI spillovers. We also discuss the main empirical hypotheses linking FDI spillovers to their underlying determinants. Section 3 summarizes and assesses the available empirical evidence bearing upon the

² For some studies that explicitly address the issue of the determinants of FDI spillovers, see Cantwell (1991), Kokko (1994), Kokko (1996) and Sjöholm (1999).

hypotheses identified in Section 2. Section 4 addresses policy implications and areas for future research.

2. Determinants of FDI Spillovers

In a stylized fashion, one can think of spillovers in a traditional market supply and demand context. In the case of FDI, foreign investors make available (directly or indirectly) appropriable technology to host country businesses. Appropriable technology should be viewed broadly as any tangible or intangible resource that can generate economic rent for host country firms, for example by improving total factor productivity. Notwithstanding our broad interpretation of the term “technology”, for convenience we shall discuss the concept in its more narrow and traditional meaning, i.e. embodied or disembodied knowledge about production and distribution.

Foreign investors presumably recognize the potential for host country firms to realize spillover benefits. They also presumably recognize that they can expend resources to mitigate spillovers if it is a profit-maximizing strategy to do so. For example, if conveying trade secrets to local affiliate managers creates “unacceptable” risks that those managers will take their knowledge to rival local firms (or to other foreign affiliates) in exchange for better pay or improved working conditions, the multinational company (MNC) might consider paying “efficiency wages” to the managers entrusted with trade secrets.³ Alternatively, the MNC might use expatriate managers from the home country in the foreign affiliate rather than local managers, since the former are less likely than the latter to defect to rival domestic companies.

³ Efficiency wages are payments above the worker’s value of marginal product or, equivalently, a side payment for organizational loyalty.

The point here is that the technology (whatever its specific nature) made available to domestic firms, and that generates spillovers, will be at least partly (if not totally) endogenously determined by the actions of foreign investors.⁴ Presumably, when it is relatively expensive to constrain the “supply” of appropriable technology in the host economy, as opposed to “internalizing” the technology within the MNC’s affiliate, greater opportunities for spillovers will willingly be made available by MNCs. When it is relatively cheap to constrain that supply, as compared to the alternative, there will be fewer opportunities for host country firms to profit from FDI spillovers.

At the same time, host country firms will need to expend resources in order to adopt the appropriable technology or, equivalently, to use that technology to generate improved productivity. When the value of the resources required for adoption is small relative to the value of the underlying technology, the demand on the part of host country firms to adopt the appropriable technology will be strong. All other things constant, the economic value of host country spillovers should also be relatively large. On the other hand, if costs of adoption are large relative to the underlying economic value of the technology (to host country firms), there will be relatively little adoption and relatively limited realized FDI spillovers.

This simple and stylized supply and demand framework for viewing the determinants of FDI spillovers will be further developed below. At this point, it should be noted that a comparable framework was previously suggested (at least implicitly) by Cantwell (1991). Nevertheless, there may be value in further developing the framework, since its essential insight is that host government policies affecting the MNC’s costs and benefits of allowing technology to be appropriated by host country firms are potentially

⁴ It is more typical in the literature to assume that this supply is exogenously determined.

important. That is, both supply and demand considerations may be important to leveraging the potential benefits of inward FDI spillovers. Identification and (if possible) quantification of factors on both the supply and demand sides of the “market for spillovers” might, therefore, offer up valuable additional degrees of (policy) freedom to decision-makers.

Determinants of Supply

As noted above, making (or allowing) technology to be available for appropriation by host country firms has an obvious potential cost to foreign investors. Specifically, it could lead to a reduction in future profits owing to a dissipation of the MNC’s underlying firm-specific advantages that, in turn, are tied to the technology in question. The potential benefits of making technology available for appropriation are slightly less obvious. One potential benefit is that it might facilitate the acquisition of even more valuable (to the MNC) technology from the host country. A related benefit is that it might promote the realization of economies of scale and scope in the innovation activity by indirectly “contracting out” research work to a larger organization. For example, the MNC might join a technology consortium with a number of host country firms in which basic and applied research results are exchanged among firms within an integrated research and development (R&D) setting.⁵

A second potential benefit is that it may encourage host country governments to convey certain commercial advantages on the MNC’s affiliates that are worth potentially more than the commercial value of the appropriable technology. Where host country

⁵ An example of the latter is Forintek, a Canadian research cooperative that includes the leading forest products companies in Canada, including affiliates of foreign-owned companies.

governments screen foreign investments for the net benefits they will make to the host economy, direct and indirect technology transfers to host country firms are usually seen as an important source of net benefits. In other cases, government contracts in technology-intensive activities such as communications and information technology require bidding firms to perform a share of value-added activities in the host country. Successful bidders must also usually perform some underlying research and development in the host country. The technological and related expertise that is made available to host country factors of production, e.g. host country scientists and engineers working for the MNC, is (effectively) potentially appropriable technology.

More generally, by directly or indirectly putting proprietary technology at risk for appropriation, the MNC reduces or avoids the costs that would be required to reduce or eliminate the risk of appropriation. Equivalently, accepting a certain risk of appropriation may facilitate increased efficiency within the MNC's global network. For example, "codifying" technology in the form of operating and technical manuals, handbooks and the like should allow easier and quicker transfers of technology from one MNC affiliate to another.⁶ Alternatively, the MNC might rely upon the temporary expatriation of parent company personnel with the requisite expertise to transfer technology to host country affiliates. The latter approach is likely to involve smaller risks of rival host country firms gaining access to the technology in question; however, it is also likely to be more expensive and time consuming than the former approach.

In short, the MNC ordinarily faces a set of benefits and costs associated with its decision about whether and how much technology it should put at risk of appropriation. The greater the expected benefits relative to the expected costs, the greater the expected

value of the technology the MNC would willingly put at risk. In this context, an understanding of the factors determining the value of FDI spillovers should focus, in part, on the factors conditioning the expected benefits and costs of putting technology at risk of appropriation.

In broad terms, the relevant costs will be a positive function of the underlying commercial value of the technology in question, as well as the capabilities of host country firms to exploit this underlying value. The benefits will be a function of the degree to which host governments protect intellectual property through institutions such as patent and trade secrets legislation.⁷ Benefits should also be a positive function of the value of the technology (or other competitive advantage) that is more readily or cheaply accessible to the MNC as a consequence of putting its own technology at risk of appropriation. As noted above, benefits include host country technologies that are directly or indirectly made available to the MNC affiliate that makes its technology available to others, or host government subsidies or purchases that are predicated on the MNC making certain technology (or technological occupations) available to host country nationals.

Determinants of Demand

The demand for the technology put at risk by the MNC should reflect optimization decisions of host country firms. Commercial exploitation of the technology will impose expected costs on host country firms. For example, it may oblige a host country firm to

⁶ The presumption, of course, is that some technology can be relatively easily codified.

⁷ The more extensive and effective the protection offered, the lower the costs that MNCs would presumably face associated with the requirement to make proprietary technology inaccessible to host country firms through other means, e.g. by minimizing the codification of the technology in inter-affiliate transfers.

undertake certain technological activities (and incur associated costs and risks) in order to increase the “complementarities” between its technological competence and that required to benefit from the MNC’s technology. In other cases, it may oblige the host country firm to undertake reverse engineering efforts, hire personnel away from foreign affiliates, pay licensing and management fees to the MNC, “patent around” intellectual property restrictions to using the MNC’s technology and so forth. The expected benefits, in return, are presumably related to the lower costs and/or increased revenues that the host country firm anticipates as a consequence of internalizing foreign-developed technology. The larger the expected benefits relative to the expected costs, the greater should be the demand for internalizing foreign-developed technology.

Summary

Table 1 summarizes the main proximate determinants of the “equilibrium” value of technological spillovers. Several of these determinants are, in turn, related to host country characteristics discussed in the literature. For example, technology that is potentially available to the MNC in direct or indirect exchange for putting its own technology at risk of appropriation should be positively related to the technological competence of host country firms. At the same time, the costs associated with absorbing foreign-developed technology should be negatively related to the technological competence of host country firms.

Table 1

Proximate Determinants of Spillovers

<u>Supply</u>	<u>Demand</u>
(-) Value of underlying technology	(+) Value of underlying technology
(-) Intellectual property protection	(-) Costs of absorbing technology
(+) Technology available in exchange	(?) Competition in host markets
(?) Competition in host markets	
(+) Other commercial benefits	

Another factor discussed in the literature is the degree of competition in host markets. On the one hand, highly competitive markets leave less scope for host country firms to ignore appropriable foreign technology, since the resulting loss in sales and profits is likely to be substantial. Put differently, managers who indulge in “X-inefficiency” by ignoring foreign technology can expect to suffer potentially severe (to their organizations) adverse economic consequences in highly competitive markets. To this extent, increased competition should increase demand for appropriable foreign technology. On the other hand, there may be small *ex ante* profits associated with absorbing foreign technology as compared to markets where firms enjoy moderate degrees of market power. All other things constant, this situation would discourage demand for foreign technology.

Host country market structure can also potentially affect the supply of foreign technology. For example, Wang and Blomström (1992) discuss a model in which stronger competition in host country markets obliges MNCs to transfer more technology to their host country affiliates to enable the latter to better compete against host country

firms. However, if the potential costs of having technology appropriated by host country firms are sufficiently large, MNCs may abandon the relevant host country market. Hence, if competition obliges MNCs to accept increased commercial risks associated with losses of firm-specific advantages, there may, at some point, be reduced inward FDI and, by extension, a reduced supply of appropriable technology.

Other host country attributes might influence the commercial benefits available to MNCs in compensation for putting firm-specific technology at risk of appropriation. In particular, the size and average real income level of the host country have been found to attract inward FDI, presumably because they are positively related to the demand for products embodying relatively high levels of intangible capital such as brand names.⁸ All other things constant, this greater demand should make the host market a more profitable place to do business.

The presence of technological centers-of-excellence in host countries creates the potential for the MNC to benefit from reverse technology flows by participating in technological activities in those centers. Along the same line, other strong locational advantages, such as the presence of relatively cheap factors of production that are intensively used by the MNC, should also increase the profitability of specific locations to foreign investors.

The potential influence of government policy on the benefits to investing and doing business in a specific host country is potentially important but also complex. Most relevant, perhaps, are host government restrictions on the extent and nature of foreign ownership. The latter are largely sector-specific; however, they tend to cover a fairly

⁸ For a review of studies linking demand to inward FDI, see Dunning (1993) and Globerman and Shapiro (forthcoming).

wide range of sectors in many countries. On the one hand, such restrictions should reduce inflows of inward FDI and, therefore, the technology that would accompany those inflows. On the other hand, foreign ownership restrictions might encourage a substitution, at the margin, of other forms of investment, such as joint ventures, for controlling ownership of host country assets. If strategic alliances, such as joint ventures, facilitate increased appropriation and usage of foreign technology, their substitution for wholly owned FDI might more than offset the “income” effect of a reduced inflow of FDI and/or a reduced transfer of technology from the parent affiliate to its host country affiliate.⁹

Finally, the technology available to the MNC related to doing business in the host country should also be a positive function of the complementarity between the MNC’s technological competence and the technological competence of host country firms. This variable is conceptually distinct from the overall technological competence of host country firms. Obviously, the value of appropriable MNC technology to host country firms will also be a positive function of the degree of complementarity.

These various hypotheses are summarized in Table 2. Specifically, the table reports variables that are plausibly theoretically related to FDI spillover benefits, and their likely relationship to the latter.

⁹ There is ample evidence that MNCs will transfer more up-to-date technology to wholly owned affiliates than to partly owned affiliates. See, for example, the discussion of technology transfer in Caves (1996, pp.166-174). However, there is very little evidence on how the form of foreign investment affects host country spillovers. For one such study, see Blomstrom and Sjöholm (1999).

Table 2

Variables Related to FDI Spillovers

<u>Variable</u>	<u>Sign</u>
1. Technological Complementarities Between MNC and Host Country Firms	+
2. Strength of Intellectual Property Protection in Host Country	-
3. Competition in Host Country Markets	?
4. Size and Wealth of Host Country	+
5. Technical Centers of Excellence in Host Country	+
6. Technical Competence of Host Country Firms	+
7. Government Policies	?

In the next section of the paper, we review available evidence on at least some of the variables discussed above.

3. Empirical Evidence on Spillover Determinants

Attempts to identify the magnitude and nature of FDI spillovers have employed various direct and indirect approaches. The direct approach has been to relate productivity measures of host country firms or industries to, among other things, the extent of foreign ownership in the host country. Indirect approaches examine different aspects of the interaction between MNCs and host country residents that are plausibly related to FDI

spillovers. These include: 1. Technology licenses. 2. Vertical linkages. 3. “Copying” of technology introduced by foreign investors. 4. Impact of FDI on host country market structure, especially competitiveness. 5. Labor training and 6. Performance of research and development (R& D) by MNC affiliates in the host country.

Direct Productivity Measures

The relevant studies typically focus on a partial productivity variable, such as value-added per employee, and relate differences across industries in partial productivity to differences in foreign presence, holding other factors “constant”. For developed countries, the limited evidence is fairly consistent in showing that the productivity of domestically owned firms is positively related to foreign presence.¹⁰ The available studies do not, however, provide substantial insight into the determinants of the productivity spillovers identified. A notable exception is the study by Imbriani and Reganati (1997) focusing on the effects of FDI on technical efficiency of Italian firms. The authors conclude that productivity levels are higher in domestic manufacturing sectors where MNCs account for larger shares. Moreover, efficiency spillovers are higher the lower the size of the technology gap between domestic and foreign firms.

There are a greater number of studies estimating direct productivity spillovers for developing countries than for developed countries. The former tend to produce more “mixed” results than the latter. In particular, a number of studies for developing countries

¹⁰ For example, Caves (1974) and Globerman (1979) identify a positive relationship for Australia and Canada, respectively, using indices of labor productivity. Nadiri (1991) concludes that increases in the capital stock owned by U.S. MNCs appears to have a positive impact on the growth of total factor productivity in the manufacturing sectors of France, Germany, the U.K. and Japan.

document that a foreign presence promotes higher productivity in host country sectors, while other studies point to limited or no significant efficiency spillovers.¹¹

The diverse experiences of developing countries with FDI efficiency spillovers provide potential insights into the determinants of those spillovers. Perhaps the most consistent finding is that the capability of host country firms to “absorb” foreign technology is an important conditioner of the magnitude of any realized spillovers. For example, Blomström (1986) finds that foreign presence lowers the average dispersion of a sector’s productivity, but that this effect is more significant in sectors with simpler technology. He interprets this to mean that the foreign presence forces local firms to become more productive in sectors where “best practice technology” lies within their grasp.

In fact, the ability of host country firms to absorb best practice technology will depend largely upon the firm-specific attributes “required” to absorb the technology relative to the attributes possessed by home country firms. Where there is a high degree of congruence between the two, spillovers should be more completely captured, all other things constant. That is, in terms of the terminology in Table 2, spillovers should be easier to identify empirically when there is greater complementarity between the technological attributes of the host country firms and MNC investors. Blomström’s results can be interpreted along these lines. More direct evidence bearing upon the hypothesis is provided by Kokko (1994) and Kokko, Tansini and Zejan (1996) who find, for Mexico and Uruguay, respectively, that spillovers are difficult to identify in industries

¹¹ Blomström and Persson (1983), Blomström (1986) and Kokko (1994) find evidence of FDI spillovers for Mexico. Blomström, Kokko and Zejan (1994) find evidence for Uruguay, and Sjöholm (1999) identifies spillovers for Indonesia. On the other hand, Haddad and Harrison (1993) and Aitken and Harrison (1991) find limited or no evidence for Morocco and Venezuela, respectively.

where foreign affiliates have much higher productivity levels than local firms.

Conversely, spillovers can be identified when foreign investors are not a self-contained “enclave” of firms.¹²

Licensing

Host country firms gain the equivalent of spillover efficiency benefits when they are able to purchase or license technology from foreign firms at a cost that is less than the value of the foreign technology to them. By doing so, they presumably gain improvements in efficiency (directly or indirectly) above and beyond the costs associated with acquiring the necessary tangible or intangible assets.¹³ In this context, the relevant issue is whether any factors have been identified in the literature that are systematically related to the surpluses realized by host country firms on technology licensed from foreign investors.

In fact, foreign investors appear to regard foreign investment and licensing as direct alternatives (Caves, 1996). In this regard, MNCs are seen as turning to licensing primarily when the direct investment option is restricted, either by government policy or some other constraint. This is because there is usually a greater perceived risk of “losing” proprietary technology to host country firms when technology is brought to the host country via the licensing option. As a result, it is unsurprising to observe that technology tends to be introduced more quickly into host countries when MNCs have the option of introducing the technology through their affiliates rather than through joint

¹² Since technology gaps are more likely to be small when MNCs invest in developed countries than in developing countries, this consideration might help explain the more consistent identification of FDI spillovers in developed host economies.

¹³ Evidence documenting the capturing of economic surplus by licensees is discussed in Caves (1996).

ventures or arms-length licensing agreements.¹⁴ Given that “forced” licensing might be a “second-best” way to promote spillovers, the relevant issue is whether technology “leakages” to host country firms under licensing arrangements are at all conditioned by the factors identified in Table 2 or other factors. Unfortunately, we have been unable to identify any studies that focus on this issue.

Vertical Linkages

Closer linkages between MNCs and domestically owned firms are presumed to enhance spillovers in the host country. For example, it is (often implicitly) presumed that closer commercial ties between MNC affiliates and “upstream” suppliers and “downstream” customers lead to a greater (uncompensated) transfer of technical and commercial information to suppliers and customers. They may also lead to the “defection” of key personnel from the MNC affiliate to domestically owned firms.

To the extent that closer vertical linkages are associated with larger spillovers to host country firms, the empirical issue is to identify the factors promoting or discouraging closer vertical linkages. With respect to the first point, the available evidence, on balance, points to the existence of efficiency benefits associated with closer vertical linkages between MNC affiliates and host country firms.¹⁵ It is often unclear whether the benefits

¹⁴ Evidence on this phenomenon is provided in Mansfield and Romeo (1980) and McFetridge (1987). An exception to these findings is Blomström and Sjöholm’s study of Indonesian establishments. The latter find that spillovers from the presence of foreign minority-owned establishments on domestic productivity are no different from those related to the presence of wholly foreign-owned establishments. They speculate that this result may be due to compensating benefits that foreign investors receive, such as government subsidies, for giving up some control over proprietary technology.

¹⁵ In particular, there is evidence of pressures that MNCs place on upstream suppliers to meet higher standards of quality, reliability and speed of delivery. See, for example, Brash (1966) for Australia, Katz (1969) for Argentina and Watanabe (1983) for the Phillipines. Aitken and Harrison (1991) conclude that spillovers from forward linkages are more readily identifiable for most Venezuelan industries than spillovers from backward linkages.

have a significant spillover component or whether host country firms must fully compensate foreign-owned affiliates for the tangible and intangible resource transfers involved. Nevertheless, it seems unlikely that MNCs will ordinarily be able to fully appropriate all of the value of the explicit and implicit transfers with their upstream and downstream host country business partners.

There is some evidence bearing upon the factors that promote vertical linkages with foreign-owned firms. Most of the available evidence is from the experience of developing countries. One robust finding is that the technical capability of potential local suppliers positively influences the extent of backward linkages. A second is that linkages are more pronounced, the larger the size of the host country market. A less robust finding is that local content requirements can promote increased local purchasing by MNE affiliates; however, the potential for the requirements to discourage inward FDI is usually not factored into the analysis (Blomström and Kokko 1998).

A study of vertical linkages in the Canadian aircraft industries sheds some light on both the relevance of vertical linkages to productivity spillovers, as well as the determinants of the nature of those linkages (De Bresson, Niosi, Dalpe and Winer, 1991). The authors conclude that foreign ownership is only indirectly important to the build-up of technological capability on the part of domestically owned suppliers. Specifically, the opportunity to design and manufacture whole systems in the commercial field over a long-period of time is the key to building up domestic technological capability, and this opportunity is not automatically associated with inward FDI. The opportunity to design and manufacture whole commercial systems is enhanced by the ability of domestically

owned firms to engage in two-way technology transfer at the early stage of the technology's life cycle.

Demonstration Effects

Related to the issue of vertical linkages is the diffusion of technology associated with its early and successful introduction by MNC affiliates. The successful introduction of new production techniques and new products reduces the subjective risk surrounding the adoption of the innovation and should, therefore promote its adoption more widely throughout the population of potential adopters in the host country. Successful demonstration effects would be reinforced by the increased competition supplied by the entry of successful and innovative foreign-owned firms within host country markets. In turn, increased competition should stimulate a faster rate of adoption of new technology.¹⁶ Two related empirical issues that are relevant in this context are: 1. Do foreign-owned firms adopt new innovations sooner than domestically owned firms? 2. What factors condition any adoption lags between foreign and domestically owned firms?

Numerous studies exist that identify and assess differences in production conditions (including technology) across foreign and domestically owned firms. However, very few consider the following question: when new technology is appropriate for domestically owned firms to use, how important is the MNC to the introduction and spread of the technology in the host country? Relevant in this regard is the study by Mansfield and Romeo (1980) which obtained from domestic firms in the United Kingdom estimates of how often their innovative efforts had been hastened in response to technology transfers from U.S. MNCs to their competing subsidiaries in the United

Kingdom. The majority expressed a belief that at least some of their products and processes had been introduced (or introduced sooner) to meet the competitive effects of the transfers. Note that this finding suggests that it is increased competition rather than “demonstration” that promotes technology adoption by domestic firms.

Several other studies suggest that the presence of foreign-owned affiliates might accelerate the introduction and adoption of new technology by host country firms. For example, a study of the Canadian paper industry found that foreign-owned affiliates were quicker to adopt a new processing innovation than their Canadian-owned counterparts, although it was unclear how important demonstration effects were in encouraging the latter to also adopt the innovation.¹⁷ For four Hong Kong industries, Chen (1983) showed a positive association between the speed of technological diffusion and the share of foreign ownership.

The results of studies that compare new technology adoption by foreign-owned and domestically owned firms therefore tend to conclude that new technology is frequently introduced sooner by foreign-owned affiliates, and that competition spurs quicker adoption of innovations by both domestically owned and foreign-owned firms. Moreover, MNCs are quicker to introduce new technology into host markets characterized by relatively high per capita incomes and high literacy rates (McFetridge, 1987). The latter can be taken as a proxy for the technical competence of the host economy, while the former might capture the attractiveness of doing business in a host market.

¹⁶ We shall discuss the potential linkages between FDI and market structure below.

¹⁷ See Globerman (1976). However, in a study of the Canadian tool and die industry, Globerman (1975) found that foreign-owned companies were no quicker than their domestically owned counterparts to adopt a

FDI and Market Structures

Inward FDI could have important indirect impacts on spillover efficiency benefits to the extent that it alters host country market structures in ways that affect those benefits. The preceding section suggests one such indirect channel of influence. Namely, if inward FDI contributes to host country markets being more competitive (or more contestable), it would contribute to the faster adoption of new technology by domestic firms. It might also encourage MNCs to introduce new technology sooner and more extensively into their foreign-owned affiliates in order to enable the latter to compete more effectively.¹⁸ More simply, increased competition might encourage a more efficient allocation of resources across industrial sectors and production establishments which, in turn, is manifested by increases in sectoral and economy-wide measures of productivity.

There are substantial problems associated with linking inward FDI to changes in market structure in host economies, especially if one focuses on “simple” measures of market structure such as industrial concentration ratios.¹⁹ Nevertheless, data restrictions frequently constrain the research focus to simple summary measures, and, in fact, the bulk of available studies do focus on the linkages between FDI and industrial concentration. The studies done for developed countries tend to conclude that MNCs are more likely than domestically owned firms to enter concentrated industries with relatively high barriers to entry. At the same time, actual inward FDI tends to have no significant long-run relationship to industrial concentration (Dunning 1993). One might

new processing innovation. Increased competition in domestic markets encouraged both foreign and domestically owned tool and die firms to adopt the innovation sooner.

¹⁸ Conversely, as mentioned earlier, vigorous competition might truncate the incentive of MNCs to introduce new technology because the opportunities to earn “economic rent” are attenuated by competition.

conclude from these observations that the potential for inward FDI contributes to domestic markets being more contestable, but that actual long-run changes in market structure are influenced by other, more fundamental factors such as minimum efficient scale relative to market size. While there is some evidence from developing countries that inward FDI is associated with increased seller concentration, it cannot be assumed that foreign presence leads to reduced competition in developing countries. This is because foreign-owned affiliates are often more aggressive domestic competitors than locally owned firms.

The potential linkage between competition and FDI spillover benefits highlights the “general equilibrium” nature of the “structural” determinants of spillover benefits. For example, domestic market structure might, itself, be an important indirect determinant of vertical linkages, technical competence of host country firms and even government policy. Nevertheless, given the apparently weak long-run relationship between inward FDI and domestic market structures, a failure to account explicitly for these indirect structural linkages may not be a serious liability of the existing literature.

Investments in Human Capital

Technology is embodied not only in machinery, equipment, patent rights and expatriate managers and technicians, but also in the human capital of the affiliates’ local employees. In turn, the latter may acquire much of their human capital through direct and indirect training received while working for foreign affiliates. In theory, employees should indirectly pay for any general human capital, i.e. fungible skills, that they acquire from employers, typically in the form of lower wages during the training period and so forth.

¹⁹ For an extensive discussion of these problems, see Dunning (1993, Chapter 15).

In fact, there is some evidence that, in practice, MNCs may pay “efficiency wages” to productive employees in their foreign affiliates in order to keep them from “defecting” to domestically owned competitors.²⁰

The training supplied for host country employees working for foreign-owned firms could affect most levels of employees- from manufacturing operatives through supervisors to advanced professionals and top-level managers. The various fungible skills gained while working for foreign-owned affiliates may, in turn, generate spillover benefits for the host economy as trained employees migrate to domestically owned firms or start their own businesses using the knowledge and skills gained through training to enhance their productivity in other organizations. This perspective on FDI spillovers generates two interrelated empirical questions: 1. What evidence is there that a significant amount of “spillover-generating” general human capital is accumulated in MNC affiliates for which employees do not directly or indirectly pay “full value.”? 2. What factors condition the accumulation of host country human capital through the FDI process?

There is only scattered evidence on these two issues, the majority of which focuses on the experiences of developing host economies. The evidence indicates that MNCs offer more training to managers and other types of employees than do privately owned local firms, and that the movement of employees from foreign-owned affiliates to other firms contributes to the diffusion of know-how.²¹ Limited evidence from developed countries suggests that manager mobility has contributed to the international diffusion of specific management practices. Moreover, the mobility of employees from MNCs in the computer and software industries contributes to spillovers, both within the industry and

²⁰ See Globerman, Ries and Vertinsky (1994).

²¹ A review of a number of relevant studies can be found in Blomström, Kokko and Zejan (2000).

elsewhere. Unfortunately, we have been unable to identify studies that attempt to quantify the magnitude of the host country spillovers associated with the training and subsequent mobility of MNC affiliate employees. Nor have we identified studies identifying the market-related factors that condition such spillovers.

Research and Development

Another activity indirectly related to the human capital of foreign affiliate employees is the performance of research and development (R&D) and other technology-promoting efforts by MNC affiliates. A long-standing policy concern about foreign ownership is that MNCs will centralize R&D in the parent affiliate and leave their foreign affiliates to perform a very modest amount of R&D that focuses primarily upon modifying parent company technology for the foreign market.²² Domestically performed R&D expenditures have been found to generate significant spillover efficiency gains, both within and across industries in the R&D performing country (Bernstein 1988, 1989). Hence, the relatively limited performance of R&D in host countries by MNCs allegedly deprives host countries of the productivity spillovers associated with domestic R&D performance. Furthermore, domestic R&D performance is also positively related to the adoption of new technology. That is, some amount of R&D performance is apparently required to facilitate new technology adoption. A “truncated” R&D function in MNC affiliates has therefore also been identified as a factor slowing technology transfers from the MNC’s home country to host country firms.

Concerns expressed about the “truncation of innovation” in host countries as a result of the centralization of R&D in the head offices of MNCs implicitly draw upon

other premises. One is that the appropriation of R&D benefits requires that the companies benefiting be in relatively close physical proximity to the R&D- performing organizations. If host country firms are readily able to “exploit” foreign technology developed abroad, any decentralization of R&D from home to host countries might have little overall impact on the spillover efficiency benefits that host country firms derive from the MNC’s R&D performance. For example, technology generated abroad might be indirectly captured by host country firms through imports, or directly captured through reverse engineering activities and the like. A second premise is that the R&D expenditures of domestically owned firms are independent of the R&D expenditures of foreign-owned firms in the host economy. Hence, less R&D performed by foreign-owned affiliates implies less R&D in total performed in the host country. In contrast, one might argue that the R&D performed by foreign affiliates is either a substitute for or a complement to the R&D performed by domestically owned firms. In this case, the impacts on host country spillovers of centralizing R&D in the home country might be either mitigated or magnified.

This admittedly cursory discussion of the relationship between the R&D performed by MNCs and FDI spillover benefits to host country economies highlights a number of complex empirical issues including: 1. How much difference does the actual physical location of MNC R&D performance make to the magnitude of host country spillover benefits? 2. If location matters, what factors condition the R&D location decisions made by MNCs. 3. What factors condition the magnitude and the nature of the spillover efficiency benefits that host countries derive from the R&D performed by foreign-owned affiliates?

²² A review of this policy issue is provided in Globerman (1985).

There is some evidence available on these issues, although it is far from conclusive. One finding seems to be that host country firms can appropriate productivity benefits from the R&D performed by foreign-owned firms whether that R&D is performed in the host country or the home country.²³ Moreover, there are several possible channels through which the benefits of the R&D performed by foreign-owned firms can be accessed by host country firms including imports of intermediate goods produced by foreign-owned firms.²⁴ A second broad finding is that R&D performed by foreign-owned firms affects the rates-of-return to R&D (and related innovation-generating activities) in domestically owned firms. The relationships appear to be quite complex, however, and seem to vary across countries and across industries within countries. Thus, in some cases, the R&D performed by foreign-owned firms is complementary to the R&D performed by domestically owned firms, but it is a substitute for the licensing of foreign technology (Basant and Fikkert 1996). In other cases, the R&D performed by foreign-owned firms is a complement to the R&D performed by domestically owned firms in certain industries, while it is a substitute for the latter in other industries (Bernstein and Mohnen 1998). A third broad finding is that the rates-of-return to domestically performed R&D are not uniformly higher or lower than rates-of-return to foreign-performed R&D. That is, there is no consistent evidence that host country firms benefit more from R&D performed domestically than from R&D performed elsewhere.

This is not to say that firms performing R&D are indifferent about where they locate their R&D activities. There is abundant evidence of locational advantages to performing certain types of R&D in specific locations, and that at least one major source

²³ For some relevant studies, see Bernstein and Mohnen (1998) and Braconier and Sjöholm (1998).

of locational advantage is “agglomeration economies.” That is, it is apparently efficient to cluster specific R&D expertise in a given geographical location, at least up to some critical scale.²⁵ Also, the locational advantages are fairly durable over time, such that MNCs tend to keep most of their R&D centralized at home headquarters (Globerman 1997).

The aforementioned findings, on balance, suggest that the spillovers from MNC R&D may be available to host country firms regardless of where that R&D is undertaken, although the underlying productivity of the R&D will be sensitive to where the R&D is performed. Also, the spillover benefits to host country firms from the R&D performed by foreign-owned firms are often quite significant. The issue then becomes: what determines the magnitude of the spillover benefits from foreign R&D that are captured by host country firms?

One factor that has been identified as conditioning the “capture” of international knowledge is human capital. For example, Engelbrecht (1997) identifies general human capital as a vehicle for international knowledge transfer associated with productivity catch-up among OECD countries, although the technology transferred was not necessarily generated in MNCs. Openness to imports also promotes the capture of international technology transfers, in part because a substantial share of technology is embodied in intermediate inputs, and in part because openness to imports is a stimulant to domestic competition (Bayoumi, Coe and Helpman 1997).²⁶ Interestingly, it is openness

²⁴ For example, Coe and Helpman integrate trade in intermediate goods into a model of international R&D spillovers.

²⁵ For evidence on these points, see Cantwell (1992), Jaffe, Trajtenberg and Henderson (1993) and Zucker, Darby and Armstrong (1998).

²⁶ Note that not all studies conclude that openness to imports is a strong stimulant to the capture of international technology transfers. For example, Sjöholm (1997) concludes that it is primarily domestic competition rather than competition from imports that promotes spillovers from FDI.

to U.S. exports that is an especially important determinant of international technology transfer captures, since the United States is apparently a disproportionate generator of appropriable commercial technologies (Park 1995).

Summary

The preceding evidence can be synthesized as follows:

1. FDI spillovers have been investigated both through statistical studies directly linking host country spillovers to foreign presence, as well as through more “structurally oriented” studies that identify channels through which FDI spillovers might be realized and then evaluate the robustness of those channels. The evidence is convincing in showing the existence of FDI efficiency spillovers in host countries, although there is no strong consensus on the associated magnitudes.
2. Studies focusing on potential channels through which FDI spillovers are realized also tend to support the empirical relevance of those channels, although there is a fair amount of heterogeneity across the relevant studies. The implication is that FDI spillovers are likely generated through a variety of activities in the host economy including labor and management training, technological “copying”, direct licensing of technology, vertical linkages in production and distribution value chains and so forth. No consensus, however, can be inferred about the relative importance of the different channels.
3. Certain factors appear to have a reasonably consistent and significant influence on the magnitude of the efficiency spillovers captured by host country firms, including spillovers that are generated outside of the host country, for example from the R&D

activities of firms based in foreign countries. One such factor seems to be the openness of the host country to imports. As noted above, to some extent, such openness is a proxy for the competitiveness of domestic markets. It is also a proxy for investment in technology embodied in intermediate inputs and capital equipment. There is also evidence that direct competition between host country firms stimulates the capture of appropriable spillover benefits. Another broad factor related to the magnitude of host country spillovers is the technical capability of local firms. Specifically, inward FDI seems to have more beneficial effects on host country productivity when host country firms enjoy traditional technological strengths.²⁷

4. Obviously, there will be few spillover efficiency benefits to capture if foreign-owned firms are less efficient and less technologically advanced than host country firms. Nevertheless, there is some evidence that too large a gap between the capabilities of MNCs and their domestically owned counterparts may attenuate the capture of spillovers by host country factors of production. A closely related notion is that potential spillovers will be more extensively captured if foreign and host country technologies (broadly defined) are complementary. Unfortunately, there is less evidence on this latter point than one might have expected.
5. The degree to which other modes of international business (besides traditional inward FDI) generate appropriable spillover benefits for the host country is an exceedingly important policy issue for which there is a disappointing amount of evidence.

Moreover, the evidence available provides no clear insight for policymakers. Some

²⁷ Cantwell's (1989) study was not previously mentioned, but it is relevant in this regard. He asserts that the technological capacity of indigenous firms was the major factor determining the success of the European corporate response to inward FDI by U.S. MNCs. Other local firms were forced out of business, especially in countries with small domestic markets. The latter presumably did not provide the same "niche"

available studies suggest that spillover benefits are not “monotonically” related to foreign presence. For example, in some studies, spillover benefits are as significant in environments where foreign investors are primarily involved in joint ventures as when foreign investors own controlling interests in the host affiliates. Other studies show, however, that the vintages of technologies transferred through the MNC vary according to the degree of foreign ownership of the affiliate. Moreover, some forms of foreign presence may be altogether discouraged if a controlling interest is denied the foreign investor. In this case, potential spillovers may be extinguished.

6. Many of the channels through which FDI spillovers can be captured exhibit interdependence. For example, training offered by MNCs might not only directly increase the technical competence of host country firms, as former MNC employees migrate to domestically owned firms, it might also encourage increased domestic competition by promoting new firm start-ups by former MNC managers and technical employees. This and other manifestations of interdependence make it more difficult to synthesize the available literature, especially since most studies do not try to identify and sort out important interdependencies.

4. Policy Implications

Some areas of government policy are obvious determinants of FDI spillovers. The most obvious example is the host government’s policy toward inward FDI. In general terms, there are two dimensions in which FDI policy can be characterized: 1. The degree to which foreign ownership is constrained, either in specific sectors or in the economy as a

opportunities as larger markets for the less technologically sophisticated firms to escape from competing with foreign-owned affiliates.

whole. 2. The degree to which business decisions of foreign investors are constrained or regulated, e.g. formal or informal requirements to carry out certain activities in the host country.

At one extreme, policies that discourage inward FDI in any form will close off channels for spillover benefits from foreign technology that rely primarily upon the physical presence of foreign investors for their capture. Moreover, such policies are likely to reduce the contestability of host country industries, especially those that are characterized by relatively high levels of industrial concentration. The available evidence suggests that reductions in contestability will reduce incentives for domestically owned firms to exploit foreign technology that is available through channels other than inward FDI. Hence, virtually all countries can count on paying a significant price, in the form of foregone spillover efficiency benefits from inward FDI, as the *quid pro quo* for indulging their preferences for economic or political “sovereignty”.²⁸

At the same time, it is more difficult to be unequivocal about the implications of policies designed to constrain or regulate the behavior of foreign investors. For example, policies that require (or encourage) MNCs to transfer technology more quickly to the host country could enhance potential spillover benefits by enriching the “pool” of appropriable technology in the host country. On the other hand, if the relevant policies reduce the *ex ante* profitability of foreign investment in the host country, the overall pool of appropriable technology might actually decline as a result of substantial reductions in inward FDI. The potential tradeoff between these two effects is likely to vary across host countries and even across industries within host countries. For example, in countries with

²⁸ In many cases, policies restricting inward FDI will reflect nothing more than the successful political lobbying of local owners of capital who want protection against competition from foreign investors.

high capabilities to absorb foreign technology and “attractive” markets for foreign investors, appropriate regulations might bring about a “net expansion” of the pool of appropriable foreign technology.²⁹ Countries with the opposite set of characteristics are more likely to suffer net decreases in the pool.

Similar contradictory effects are related to host government policies that oblige MNCs to form joint ventures or other strategic alliances with domestically owned companies. Although the diffusion of technology to local users is likely to be faster when there is a technically competent local equity partner, it is also likely that the “commercial value” of foreign technology “invested” in the venture by the foreign partner will be lower. In this regard, Blomström and Zejan (1991) argue that the MNCs most likely to accept joint ventures are typically not those with the most valuable technological assets. On the other hand, comparing the spillover effects of wholly owned MNC affiliates and joint ventures in Indonesia, Blomström and Sjöholm (1999) find no significant differences.

Trade policy has the indirect potential to influence spillovers. In particular, it has been found that an “open” regime towards imports can stimulate the capture of foreign technology spillovers in at least two ways. One is by facilitating the importation of technology embodied in capital goods and intermediate inputs. A second is by stimulating increased competition in domestic industries, thereby encouraging foreign-owned firms to transfer technology more quickly to their host country affiliates, while encouraging domestically owned firms to capitalize on available appropriable foreign technology.

²⁹ Up until recently, Japan would appear to offer the quintessential example of the successful exploitation of regulation and restrictions to encourage technology transfer with the minimum associated amount of

One potential source of ambiguity with respect to the claim that freer trade encourages host country spillovers is the recognition that tariff barriers can encourage inward FDI as a substitute for exporting. As a result, spillovers associated with the presence of foreign-owned affiliates might actually increase. Notwithstanding, protectionism has a variety of other adverse consequences for host economies that are likely to discourage FDI spillovers in the long-run, including slower economic growth and the slower accumulation of technical competence and other manifestations of human capital.

Technology policy is a third area that has potentially important impacts upon FDI spillover benefits. For example, government policies encouraging the performance of R&D in the host economy should enhance the technical capability of local firms. All other things constant, this should enhance the capability of host country firms to exploit appropriable foreign technology. Yet, even this seemingly obvious conclusion must be hedged. Specifically, while there is relatively little direct evidence on the point, it can be argued that complementarities between the technical competencies of foreign and domestically owned firms strongly condition the magnitude of actual spillover benefits. Hence, government policies might increase the technical competence of local firms in meaningful ways, yet reduce the “fit” between local technical competencies and those enjoyed by likely foreign investors.

A possible example in this context is offered by Canada’s technology policies. The Canadian government has tended to encourage R&D in areas such as telecommunications and commercial aircraft. These are traditional areas of technological strength in the United States- the single largest source of inward FDI for Canada. Much

inward FDI.

of the technology developed in Canada is competitive with U.S. technological developments. Indeed, an intention of the Canadian government is to protect Canadian “economic sovereignty” in these technically advanced industries. As a result, the technology developed by Canadian companies in the relevant industries is often a substitute for technologies developed by counterpart U.S. companies. The latter will usually find it cheaper to conduct similar types of innovation in their home country affiliates.

Another potentially important aspect of government technology policy is intellectual property protection. Industry representatives from a number of technology industries, most notably the pharmaceutical industry, argue that secure intellectual property rights in host countries are an important precondition for inflows of valuable technologies to host countries, including those associated with the performance of domestic R&D by foreign affiliates. In this regard, Mansfield (1994) has shown that the character of a country’s system of intellectual property protection has a significant effect on FDI flows, as well as on the quality and quantity of technology transferred by U.S. firms to their foreign affiliates. At the same time, there is ample research showing that formal intellectual property protection is not an important vehicle for protecting proprietary technology in most industries. In fact, there has been almost no attention paid in the literature to intellectual property regimes as a determinant of the size and scope of FDI spillovers.

The existence of spillover efficiency benefits would seem to call for some sort of government policy reaction, as it seems a clear manifestation of an externality. In particular, it would seem to argue for aggressive actions by government to encourage

inward FDI. To do so effectively, of course, implies the need for knowledge about cost-effective levers to encourage inward FDI and to capture FDI spillovers. In fact, the existing literature offers only limited and fairly circumscribed insight into the determinants of FDI spillovers. Nevertheless, the insights offered are gratifying inasmuch as they reinforce conventional verities of public policy including the promotion of competitive markets, scientific training and education and the performance of research and development.

The existence of spillover efficiency benefits would also seem to call more broadly for technology transfer policies on the part of host governments. Unfortunately, such policies are often counterproductive inasmuch as they may discourage inward FDI, and associated inflows of technology, especially when they impose additional costs on foreign investors. There is a natural temptation for host governments to attempt to extract technology transfer commitments from foreign investors with a view that those investors anticipate earning economic rent by operating in the host country. Hence, additional costs imposed on foreign investors, up to some maximum, may not discourage or even modify investment plans. While economic rent is undoubtedly anticipated across a range of foreign investments, host country bureaucrats are unlikely to be able to identify their existence beforehand, let alone calibrate the limit to the costs they can impose upon the foreign investor without discouraging investments.

To be sure, governments will continue to implement policies designed to lever greater spillover benefits from foreign investment. Hence, setting an agenda for future research seems appropriate. Without worrying about the costs, or even the practicality of the research projects implied, it seems to us that one area for research with significant

potential policy payoffs is to identify whether spillovers are generic to most types of inward FDI, or whether specific MNCs account for the bulk of host country spillovers. R&D and patent holdings tend to be concentrated among a relatively small number of leading MNCs, thereby suggesting that the source of spillovers is concentrated among a relatively small number of foreign investors. Moreover, government policies are frequently targeted at attracting specific MNC investors, or types of investment. These considerations point to the relevance of a more “micro” focused analysis of FDI spillovers. The effectiveness and efficiency of firm or sector-specific FDI policies could obviously be improved if identification of the major MNC “spillover generators” was possible. On the other hand, if identification were either impossible or irrelevant, additional arguments would be generated for focusing public policy exclusively on getting the “broad environment” right for generating and exploiting FDI spillovers.

A second area for research might focus on the distributional implications of FDI spillovers. While neoclassical theory broadly suggests that host country workers gain while host country capitalists lose from inward FDI, modern theories of the FDI process indicate that this perception is much too simple and stylized to be predictive of the distributional effects of liberalized capital markets. Yet it may also be too simplistic to assume that the spillover benefits from inward FDI are broadly distributed in the host country, either geographically or demographically. While adverse distributional consequences of inward FDI may not obviate the desirability of foreign investment based upon efficiency considerations, they may highlight the need for, and the nature of, policies to ensure that the benefits of open capital markets are broadly and “fairly” distributed.

Finally, the research agenda should accommodate studies of the linkages between intellectual property regimes and spillover benefits. In smaller developed and developing countries, there has been a temptation on the part of governments to implement relatively weak intellectual property protection given the (valid) perception that the bulk of the property involved is owned by large, foreign-owned companies. At the same time, the foreign-owned companies argue that host countries are hurting themselves with weak intellectual property laws by discouraging transfers-of-technology from abroad. The emergence and growth of new high-technology areas such as biotechnology and computer-communications has heightened the policy-related importance of understanding the interactions between intellectual property protection and FDI spillover benefits.

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